FIG.1

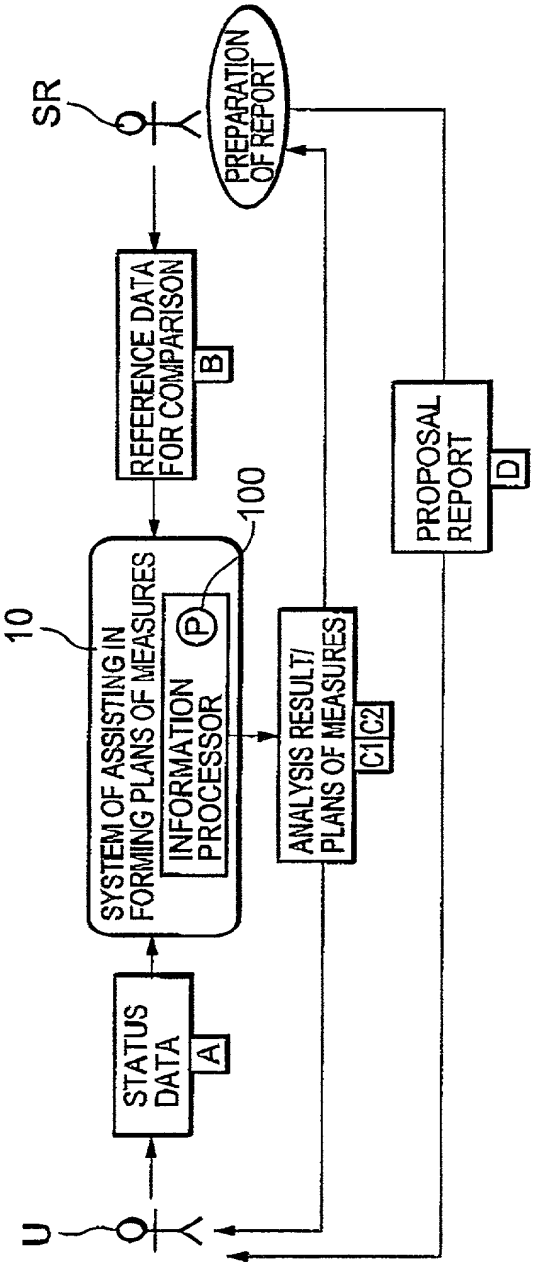

SR
PREPARATION OF REPORT
REFERENCE DATA FOR COMPARISON
B
10
SYSTEM OF ASSISTING IN FORMING PLANS OF MEASURES
INFORMATION PROCESSOR
P
100
STATUS DATA
A
ANALYSIS RESULT/ PLANS OF MEASURES
C1 C2
PROPOSAL REPORT
D
U

FIG.2A

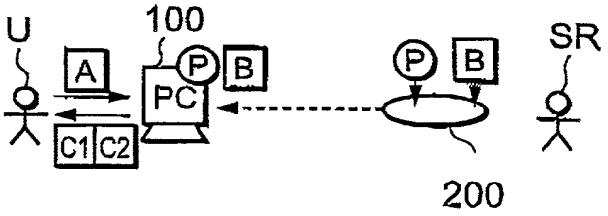


FIG.2B

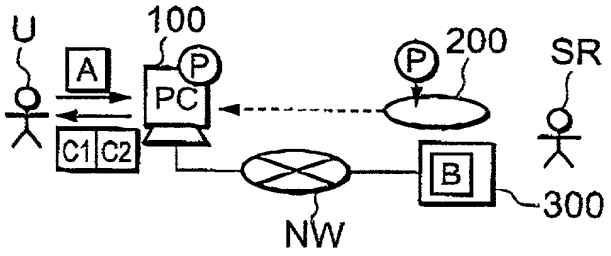


FIG.2C

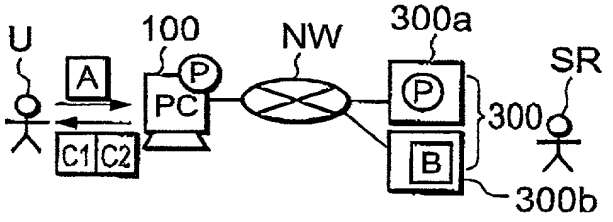


FIG.2D

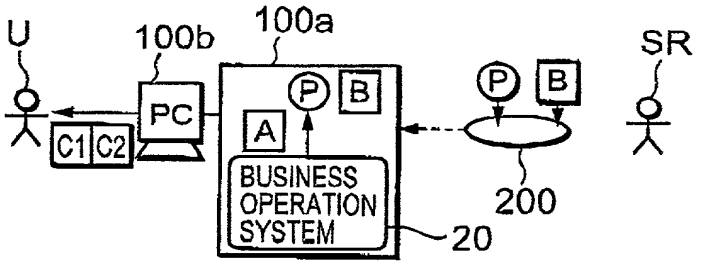


FIG.2E

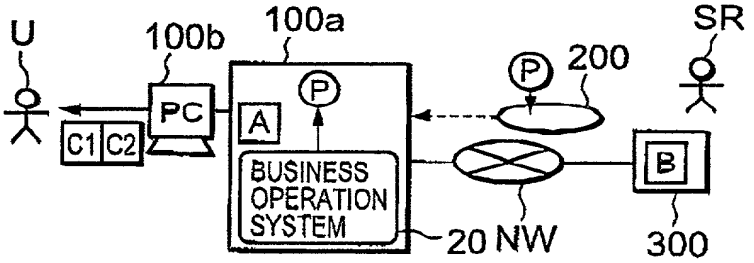


FIG.2F

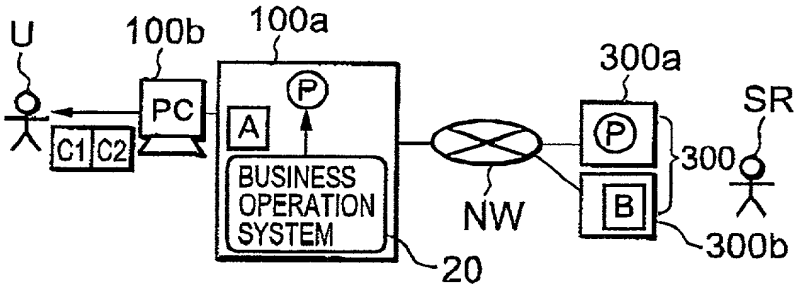


FIG.3

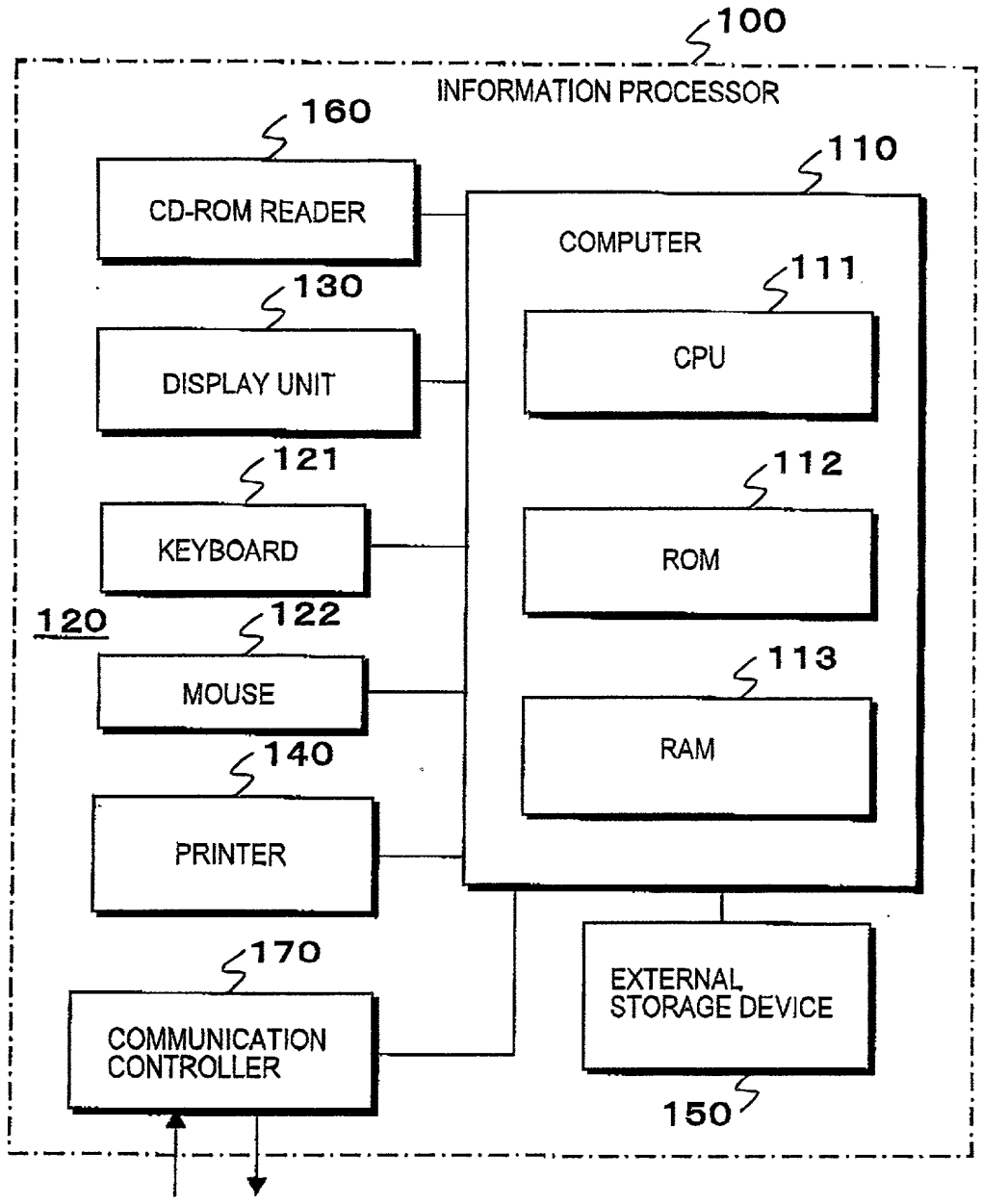

100
INFORMATION PROCESSOR
160
CD-ROM READER
110
COMPUTER
130
DISPLAY UNIT
111
CPU
121
KEYBOARD
112
ROM
120
122
MOUSE
113
RAM
140
PRINTER
170
COMMUNICATION CONTROLLER
EXTERNAL STORAGE DEVICE
150

FIG.4

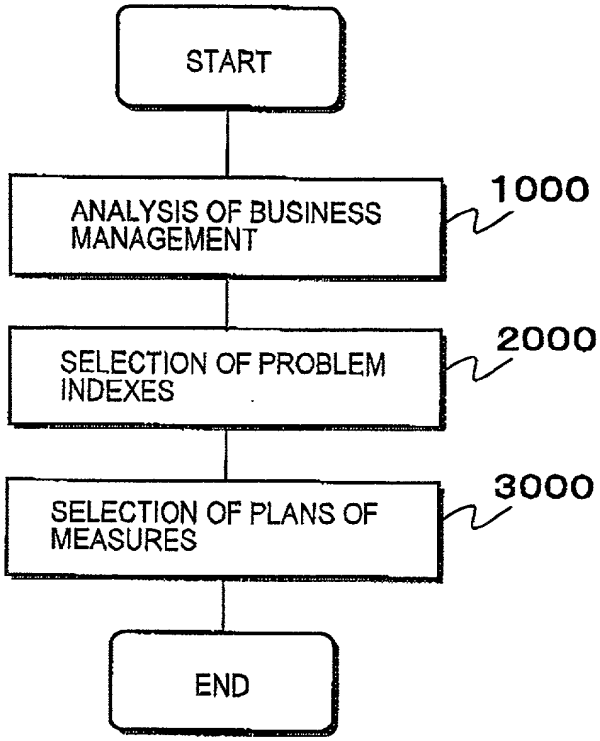

START
ANALYSIS OF BUSINESS MANAGEMENT
1000
SELECTION OF PROBLEM INDEXES
2000
SELECTION OF PLANS OF MEASURES
3000
END

FIG.5

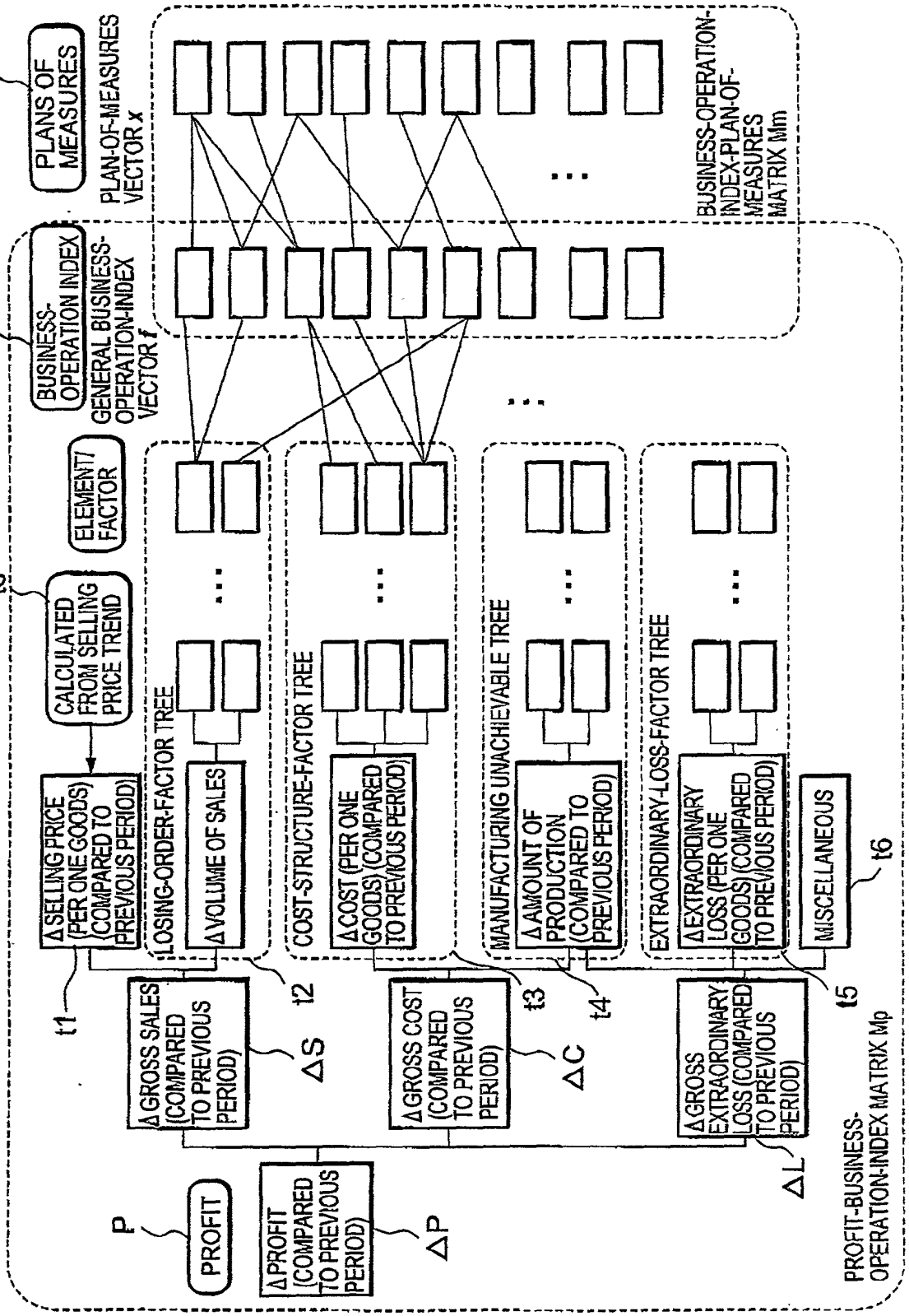

X
PLANS OF MEASURES
PLAN-OF-MEASURES VECTOR x
BUSINESS-OPERATION-INDEX-PLAN-OF-MEASURES MATRIX Mm
F
BUSINESS-OPERATION INDEX
GENERAL BUSINESS-OPERATION-INDEX VECTOR f
ELEMENT/FACTOR
t0
CALCULATED FROM SELLING PRICE TREND
Δ SELLING PRICE (PER ONE GOODS) (COMPARED TO PREVIOUS PERIOD)
LOSING-ORDER-FACTOR TREE
Δ VOLUME OF SALES
COST-STRUCTURE-FACTOR TREE
Δ COST (PER ONE GOODS) (COMPARED TO PREVIOUS PERIOD)
MANUFACTURING UNACHIEVABLE TREE
Δ AMOUNT OF PRODUCTION (COMPARED TO PREVIOUS PERIOD)
EXTRAORDINARY-LOSS-FACTOR TREE
Δ EXTRAORDINARY LOSS (PER ONE GOODS) (COMPARED TO PREVIOUS PERIOD)
MISCELLANEOUS
t1
t2
t3
t4
t5
t6
Δ GROSS SALES (COMPARED TO PREVIOUS PERIOD)
ΔS
Δ GROSS COST (COMPARED TO PREVIOUS PERIOD)
ΔC
Δ GROSS EXTRAORDINARY LOSS (COMPARED TO PREVIOUS PERIOD)
ΔL
P
PROFIT
Δ PROFIT (COMPARED TO PREVIOUS PERIOD)
ΔP
PROFIT-BUSINESS-OPERATION-INDEX MATRIX Mp

FIG.6

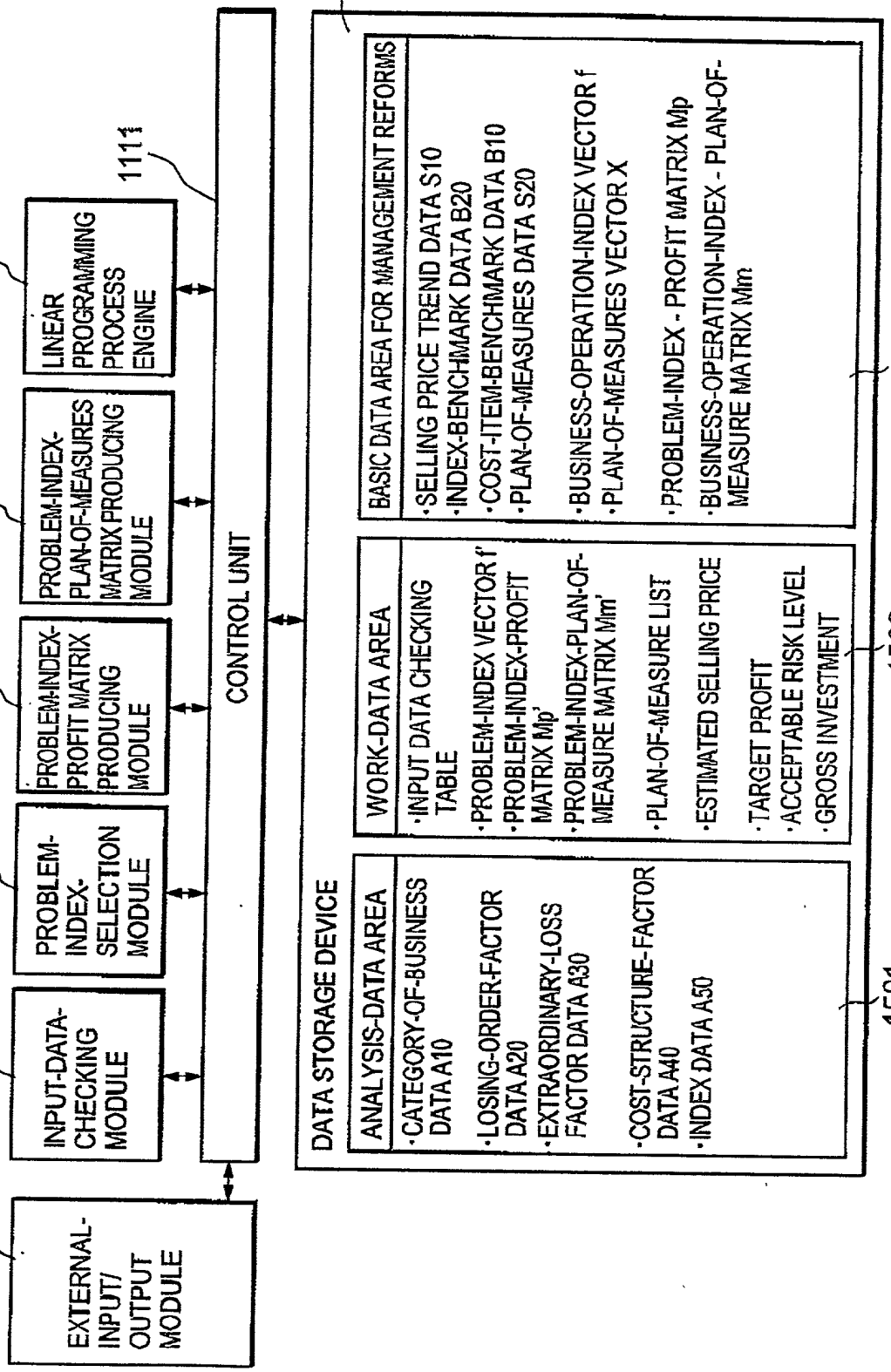

1106
EXTERNAL-INPUT/OUTPUT MODULE
1101
INPUT-DATA-CHECKING MODULE
1102
PROBLEM-INDEX-SELECTION MODULE
1103
PROBLEM-INDEX-PROFIT MATRIX PRODUCING MODULE
1104
PROBLEM-INDEX-PLAN-OF-MEASURES MATRIX PRODUCING MODULE
1105
LINEAR PROGRAMMING PROCESS ENGINE
1111
CONTROL UNIT
1500
DATA STORAGE DEVICE
ANALYSIS-DATA AREA
·CATEGORY-OF-BUSINESS DATA A10
·LOSING-ORDER-FACTOR DATA A20
·EXTRAORDINARY-LOSS FACTOR DATA A30
·COST-STRUCTURE-FACTOR DATA A40
·INDEX DATA A50
1501
WORK-DATA AREA
·INPUT DATA CHECKING TABLE
·PROBLEM-INDEX VECTOR f'
·PROBLEM-INDEX-PROFIT MATRIX Mp'
·PROBLEM-INDEX-PLAN-OF-MEASURE MATRIX Mm'
·PLAN-OF-MEASURE LIST
·ESTIMATED SELLING PRICE
·TARGET PROFIT
·ACCEPTABLE RISK LEVEL
·GROSS INVESTMENT
1502
BASIC DATA AREA FOR MANAGEMENT REFORMS
·SELLING PRICE TREND DATA S10
·INDEX-BENCHMARK DATA B20
·COST-ITEM-BENCHMARK DATA B10
·PLAN-OF-MEASURES DATA S20
·BUSINESS-OPERATION-INDEX VECTOR f
·PLAN-OF-MEASURES VECTOR X
·PROBLEM-INDEX - PROFIT MATRIX Mp
·BUSINESS-OPERATION-INDEX - PLAN-OF-MEASURE MATRIX Mm
1503

FIG.7

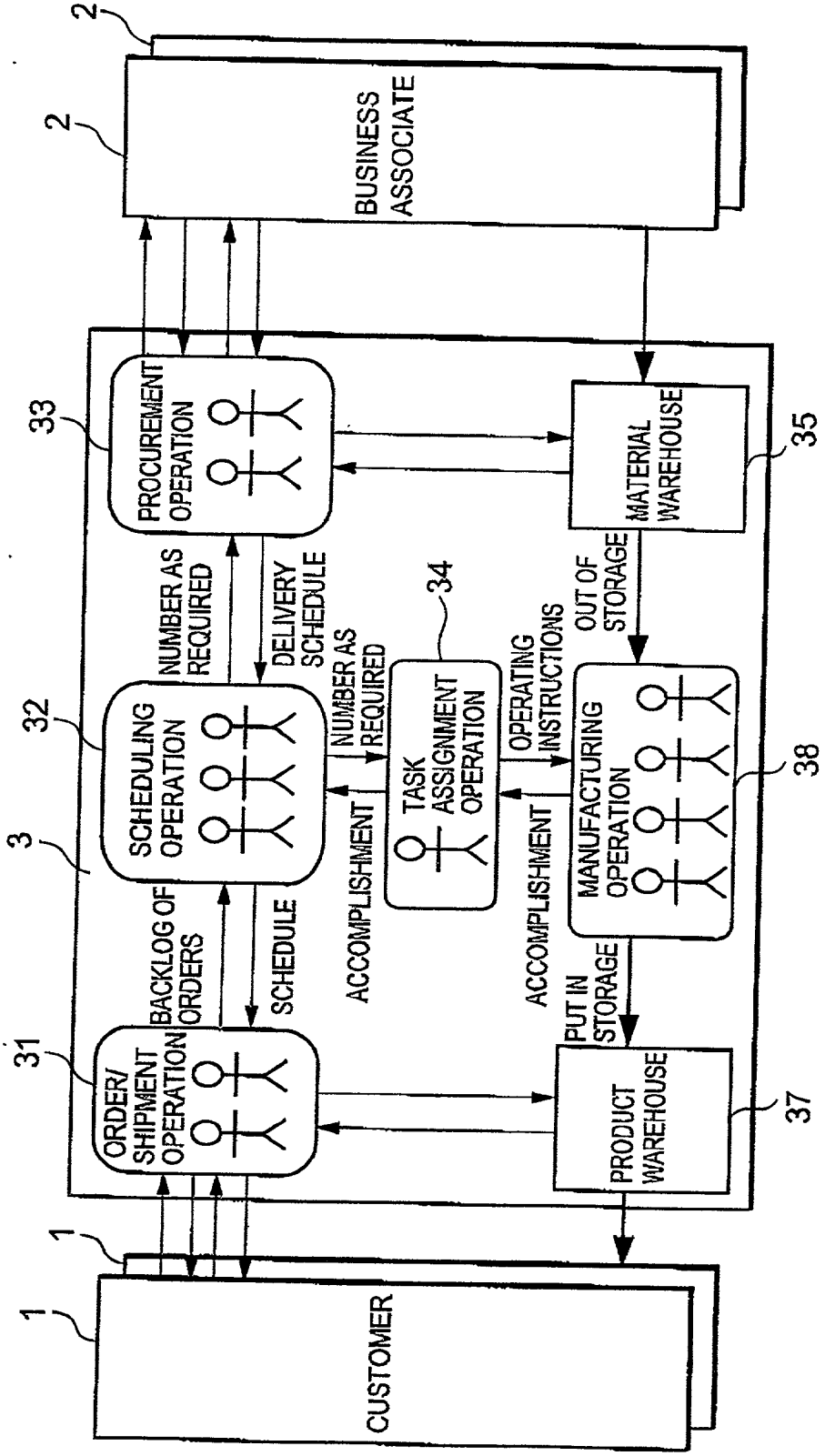

2
BUSINESS ASSOCIATE
1
CUSTOMER
3
33
PROCUREMENT OPERATION
32
SCHEDULING OPERATION
31
ORDER/ SHIPMENT OPERATION
34
TASK ASSIGNMENT OPERATION
35
MATERIAL WAREHOUSE
38
MANUFACTURING OPERATION
37
PRODUCT WAREHOUSE
NUMBER AS REQUIRED
DELIVERY SCHEDULE
NUMBER AS REQUIRED
OUT OF STORAGE
OPERATING INSTRUCTIONS
BACKLOG OF ORDERS
SCHEDULE
ACCOMPLISHMENT
ACCOMPLISHMENT
PUT IN STORAGE

FIG.8

A10

	MAJOR DIVISION OF CATEGORY OF BUSINESS	MINOR DIVISION
1	MANUFACTURING INDUSTRIES	HIGH-TECHNOLOGY PRODUCT ASSEMBLING

FIG.9

A20

	LOSING-ORDER FACTOR	RELATIONAL EXPRESSION OF LOSING-ORDER FACTOR
1	DELAY OF PRESENTING ESTIMATE	$\Delta V = \beta \cdot \Delta LTq$

FIG.10

A30

	EXTRAORDINARY-LOSS FACTOR	RELATIONAL EXPRESSION OF EXTRAORDINARY-LOSS-FACTOR
1	TOO LONG SCHEDULING TOTAL LEAD TIME LT	$\Delta L = \alpha \cdot \Delta LTt$

FIG.11

A40

MAJOR ITEM	MINOR ITEM	RATIO RELATIVE TO SALES (%)
OVERHEAD COST		20
	ORDER/SHIPMENT OPERATION	6
	SCHEDULING OPERATION	8
	PROCUREMENT OPERATION	6
DISPATCH COST		3
	PRODUCT SHIPPING COST	3
DIRECT LABOR COST		12
	TASK ASSIGNMENT OPERATION	2
	MANUFACTURING OPERATION	10
DIRECT MATERIAL COST		60
	MATERIAL A	20
	MATERIAL B	40
TOTAL COST		95
OPERATING PROFIT		5
EXTRAORDINARY LOSS		2
	DISPOSE OF UNDERPERFORMING ASSETS	2
PROFIT OF CURRENT PERIOD		3

FIG.12

A50

MAJOR ITEM	MINOR ITEM	INDEX VALUE
INDIRECT LABOR EFFICIENCY (SHIPPING QUANTITY/MAN)		
	ORDER/SHIPMENT OPERATION	100
	SCHEDULING OPERATION	20
	PROCUREMENT OPERATION	40
DIRECT LABOR EFFICIENCY (SHIPPING QUANTITY/MAN)		
	TASK ASSIGNMENT OPERATION	100
	MANUFACTURING OPERATION	10
INDIRECT LABOR LEAD TIME (NUMBER OF DAY/TIME)		
	ORDER/SHIPMENT OPERATION	5
	SCHEDULING OPERATION	20
	PROCUREMENT OPERATION	10

FIG.13

S10

	RELATIVE SELLING PRICE (BASED ON CURRENT PERIOD BEING TAKEN AS UNITY)
SECOND PREVIOUS PERIOD	1.25
PREVIOUS PERIOD	1.05
CURRENT PERIOD	1

FIG.14

B10

MAJOR ITEM	MINOR ITEM	RATIO RELATIVE TO SALES (%)
OVERHEAD COST		5
	ORDER/SHIPMENT OPERATION	1
	SCHEDULING OPERATION	2
	PROCUREMENT OPERATION	1
DISPATCH COST		3
	PRODUCT SHIPPING COST	3
DIRECT LABOR COST		7
	TASK ASSIGNMENT OPERATION	?
	MANUFACTURING OPERATION	?
DIRECT MATERIAL COST		60
	MATERIAL A	20
	MATERIAL B	40
TOTAL COST		85
OPERATING PROFIT		15

EP 2 693 358 A1

FIG.15

B20

MAJOR ITEM	MINOR ITEM	INDEX VALUE
INDIRECT LABOR EFFICIENCY (SHIPPING QUANTITY/MAN)		
	ORDER/SHIPMENT OPERATION	500
	SCHEDULING OPERATION	100
	PROCUREMENT OPERATION	130
DIRECT LABOR EFFICIENCY (SHIPPING QUANTITY/MAN)		
	TASK ASSIGNMENT OPERATION	500
	MANUFACTURING OPERATION	10
INDIRECT LABOR LEAD TIME (NUMBER OF DAY/TIME)		
	ORDER/SHIPMENT OPERATION	1
	SCHEDULING OPERATION	5
	PROCUREMENT OPERATION	5

FIG.16

	PLAN OF MEASURES (S21)	INVESTMENT COST (M¥) (S20)	RISK LEVEL (S22, S23)
1	INTRODUCTION OF ORDER MANAGEMENT SUBSYSTEM 1	5	1
2	INTRODUCTION OF ORDER MANAGEMENT SUBSYSTEM 2	7	1
3	INTRODUCTION OF ORDER MANAGEMENT SUBSYSTEM 3	3	2
4	INTRODUCTION OF PRODUCTION MANAGEMENT SUBSYSTEM 1	10	1
5	INTRODUCTION OF PRODUCTION MANAGEMENT SUBSYSTEM 2	10	1
6	INTRODUCTION OF PRODUCTION MANAGEMENT SUBSYSTEM 3	10	2
7	INTRODUCTION OF PROCUREMENT MANAGEMENT SUBSYSTEM 1	3	1
8	INTRODUCTION OF PROCUREMENT MANAGEMENT SUBSYSTEM 2	10	2
9	INTRODUCTION OF PLANT 1 FOR PRODUCTION	10	1
10	INTRODUCTION OF PLANT 2 FOR PRODUCTION	500	3

FIG.17

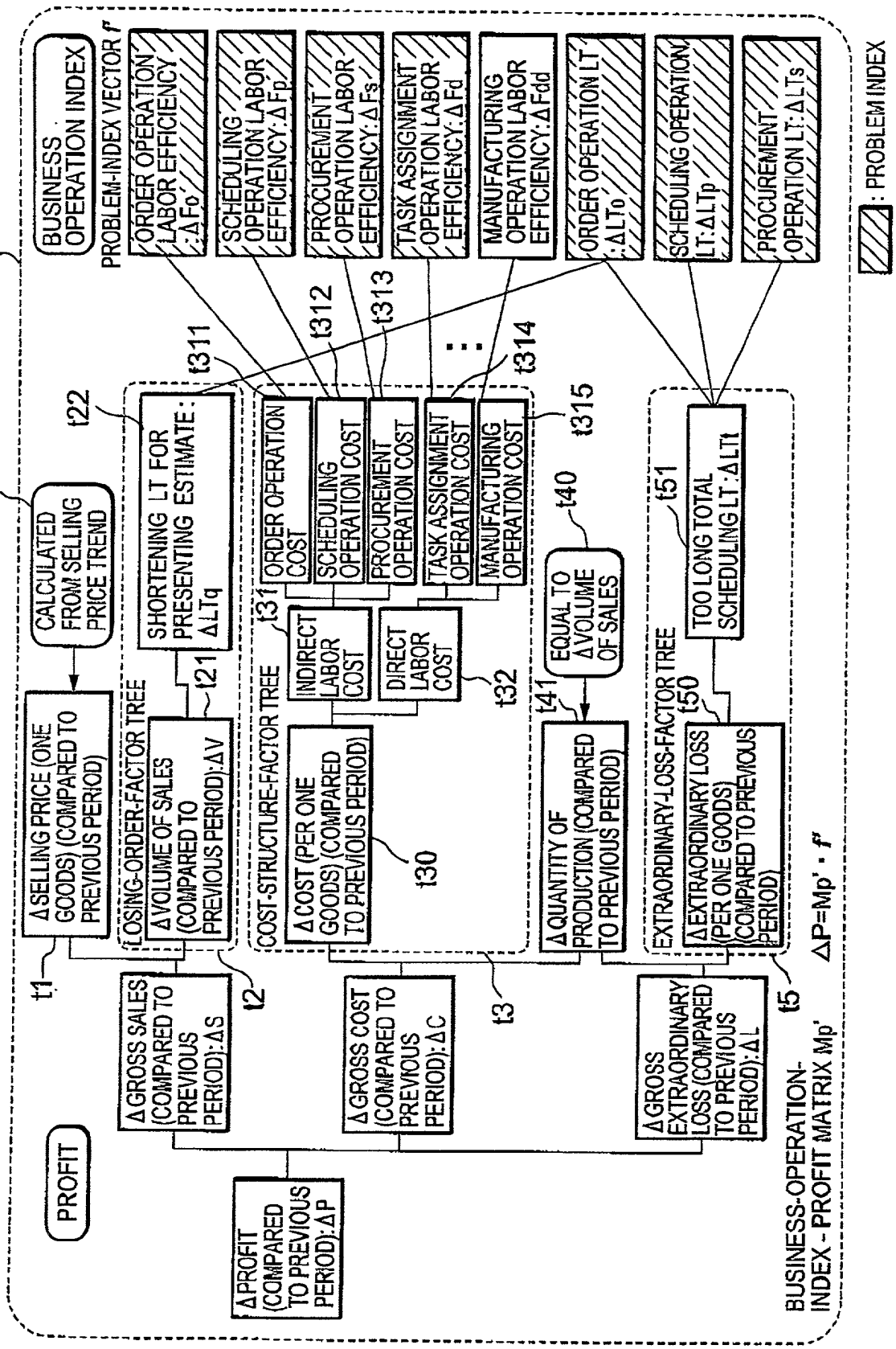

131
BUSINESS OPERATION INDEX
PROBLEM-INDEX VECTOR f'
ORDER OPERATION LABOR EFFICIENCY: ΔFo'
SCHEDULING OPERATION LABOR EFFICIENCY: ΔFp'
PROCUREMENT OPERATION LABOR EFFICIENCY: ΔFs'
TASK ASSIGNMENT OPERATION LABOR EFFICIENCY: ΔFd
MANUFACTURING OPERATION LABOR EFFICIENCY: ΔFdd
ORDER OPERATION LT: ΔLTo'
SCHEDULING OPERATION LT: ΔLTp
PROCUREMENT OPERATION LT: ΔLTs
t311
t312
t313
t314
t315
t0
t22
CALCULATED FROM SELLING PRICE TREND
SHORTENING LT FOR PRESENTING ESTIMATE: ΔLTq
t21
LOSING-ORDER-FACTOR TREE
ΔSELLING PRICE (ONE GOODS) (COMPARED TO PREVIOUS PERIOD)
ΔVOLUME OF SALES (COMPARED TO PREVIOUS PERIOD): ΔV
t1
t2
COST-STRUCTURE-FACTOR TREE
t31
ORDER OPERATION COST
SCHEDULING OPERATION COST
PROCUREMENT OPERATION COST
TASK ASSIGNMENT OPERATION COST
MANUFACTURING OPERATION COST
INDIRECT LABOR COST
DIRECT LABOR COST
t32
ΔCOST (PER ONE GOODS) (COMPARED TO PREVIOUS PERIOD)
t30
t3
t40
EQUAL TO ΔVOLUME OF SALES
t41
ΔQUANTITY OF PRODUCTION (COMPARED TO PREVIOUS PERIOD)
EXTRAORDINARY-LOSS-FACTOR TREE
t51
TOO LONG TOTAL SCHEDULING LT: ΔLTt
t50
ΔEXTRAORDINARY LOSS (PER ONE GOODS) (COMPARED TO PREVIOUS PERIOD)
t5
ΔGROSS SALES (COMPARED TO PREVIOUS PERIOD): ΔS
ΔGROSS COST (COMPARED TO PREVIOUS PERIOD): ΔC
ΔGROSS EXTRAORDINARY LOSS (COMPARED TO PREVIOUS PERIOD): ΔL
PROFIT
ΔPROFIT (COMPARED TO PREVIOUS PERIOD): ΔP
BUSINESS-OPERATION-INDEX - PROFIT MATRIX Mp'
ΔP=Mp' · f'
: PROBLEM INDEX

FIG.18

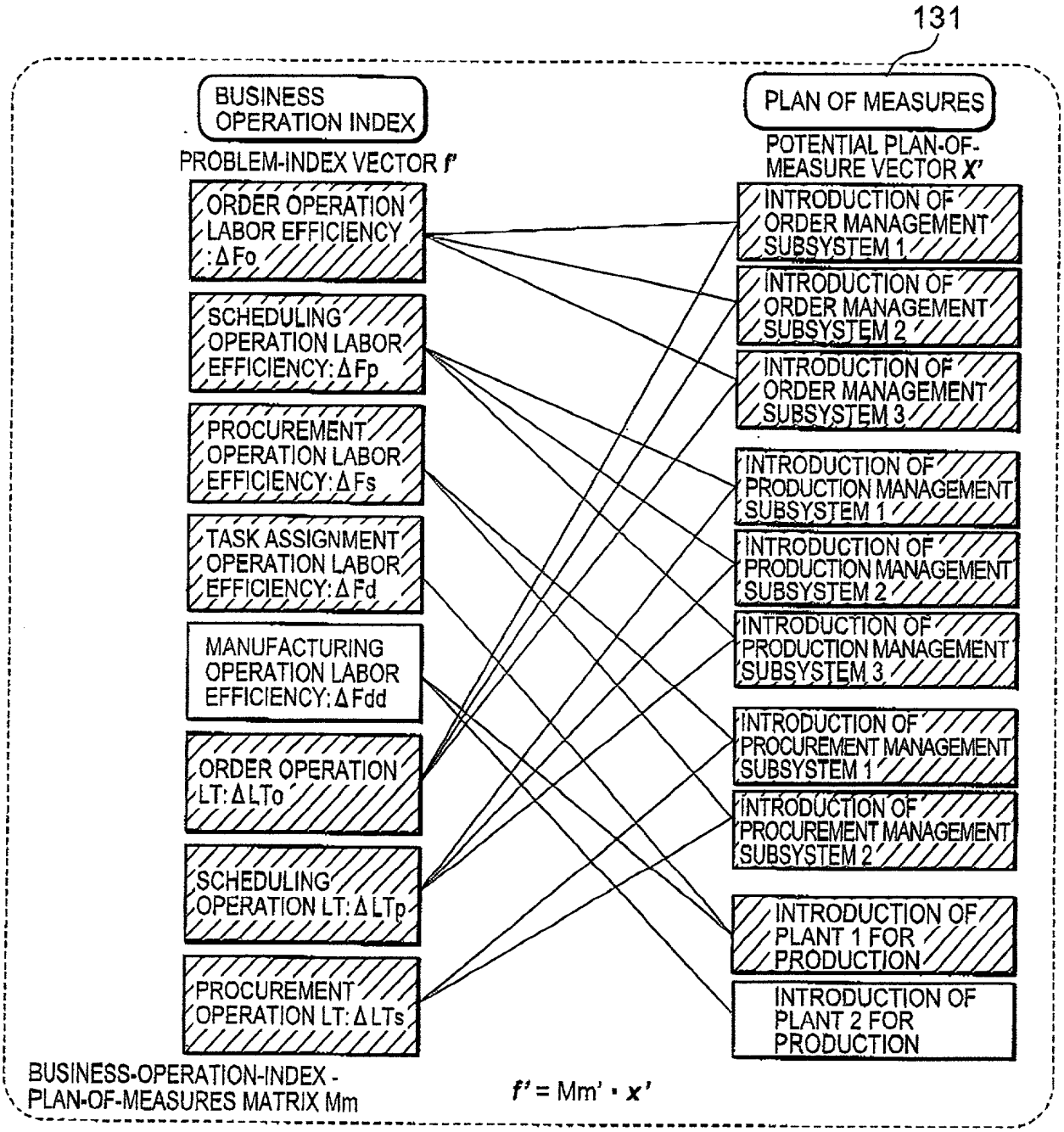

131
BUSINESS OPERATION INDEX
PROBLEM-INDEX VECTOR f'
ORDER OPERATION LABOR EFFICIENCY: ΔFo
SCHEDULING OPERATION LABOR EFFICIENCY: ΔFp
PROCUREMENT OPERATION LABOR EFFICIENCY: ΔFs
TASK ASSIGNMENT OPERATION LABOR EFFICIENCY: ΔFd
MANUFACTURING OPERATION LABOR EFFICIENCY: ΔFdd
ORDER OPERATION LT: ΔLTo
SCHEDULING OPERATION LT: ΔLTp
PROCUREMENT OPERATION LT: ΔLTs
PLAN OF MEASURES
POTENTIAL PLAN-OF-MEASURE VECTOR X'
INTRODUCTION OF ORDER MANAGEMENT SUBSYSTEM 1
INTRODUCTION OF ORDER MANAGEMENT SUBSYSTEM 2
INTRODUCTION OF ORDER MANAGEMENT SUBSYSTEM 3
INTRODUCTION OF PRODUCTION MANAGEMENT SUBSYSTEM 1
INTRODUCTION OF PRODUCTION MANAGEMENT SUBSYSTEM 2
INTRODUCTION OF PRODUCTION MANAGEMENT SUBSYSTEM 3
INTRODUCTION OF PROCUREMENT MANAGEMENT SUBSYSTEM 1
INTRODUCTION OF PROCUREMENT MANAGEMENT SUBSYSTEM 2
INTRODUCTION OF PLANT 1 FOR PRODUCTION
INTRODUCTION OF PLANT 2 FOR PRODUCTION
BUSINESS-OPERATION-INDEX - PLAN-OF-MEASURES MATRIX Mm
f' = Mm' · x'

FIG.19

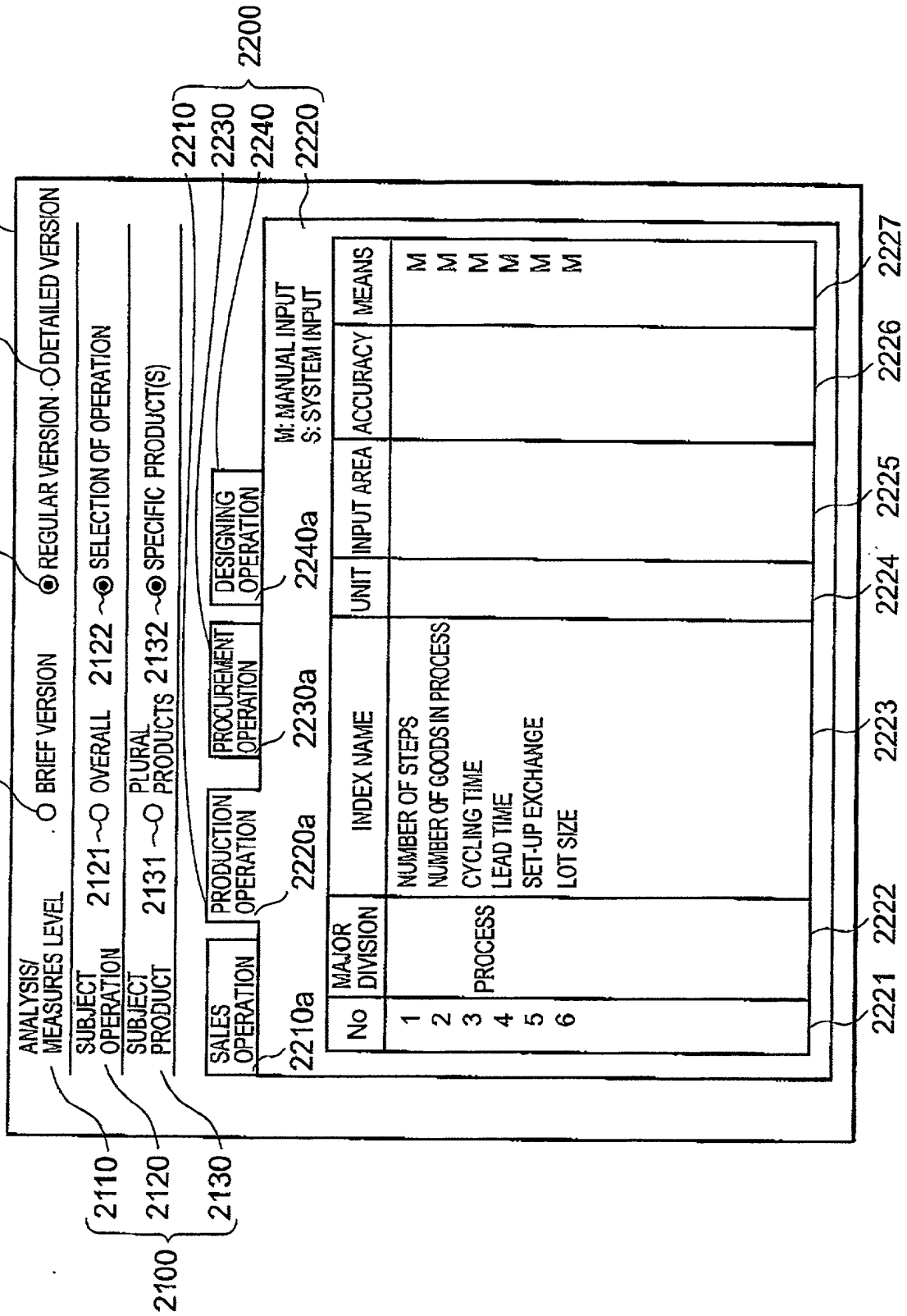

2009
2111
2112
2113
ANALYSIS/ MEASURES LEVEL
BRIEF VERSION
REGULAR VERSION
DETAILED VERSION
SUBJECT OPERATION
2121
OVERALL
2122
SELECTION OF OPERATION
SUBJECT PRODUCT
2131
PLURAL PRODUCTS
2132
SPECIFIC PRODUCT(S)
2110
2120
2130
2100
2200
2210
2230
2240
2220
SALES OPERATION
PRODUCTION OPERATION
PROCUREMENT OPERATION
DESIGNING OPERATION
M: MANUAL INPUT
S: SYSTEM INPUT
2210a
2220a
2230a
2240a
No
MAJOR DIVISION
INDEX NAME
UNIT
INPUT AREA
ACCURACY
MEANS
1
2
3
4
5
6
PROCESS
NUMBER OF STEPS
NUMBER OF GOODS IN PROCESS
CYCLING TIME
LEAD TIME
SET-UP EXCHANGE
LOT SIZE
M
2221
2222
2223
2224
2225
2226
2227

FIG.20

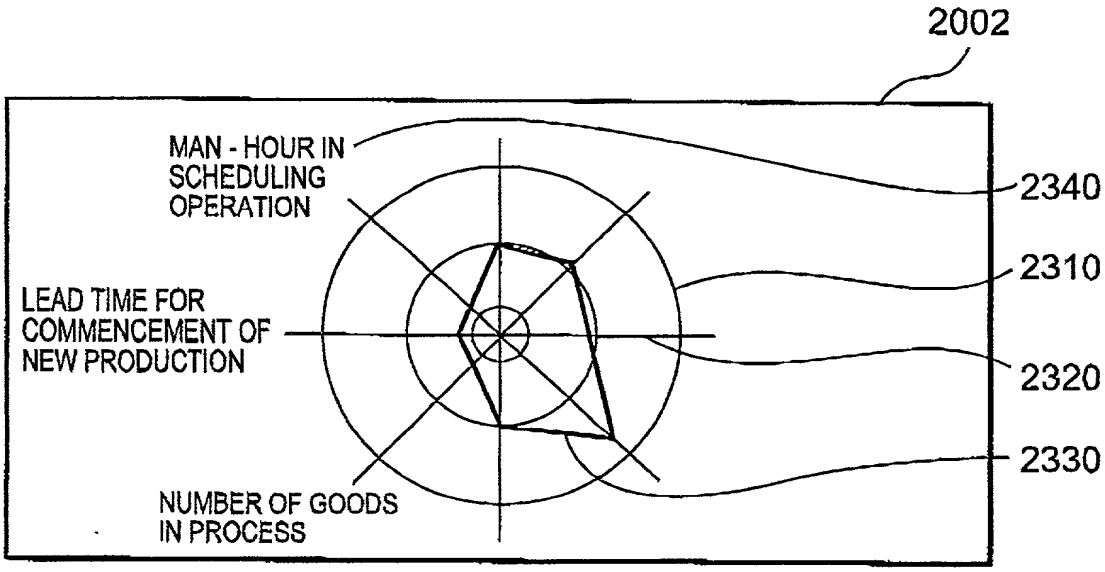

2002
MAN - HOUR IN SCHEDULING OPERATION
2340
2310
LEAD TIME FOR COMMENCEMENT OF NEW PRODUCTION
2320
2330
NUMBER OF GOODS IN PROCESS

FIG.21

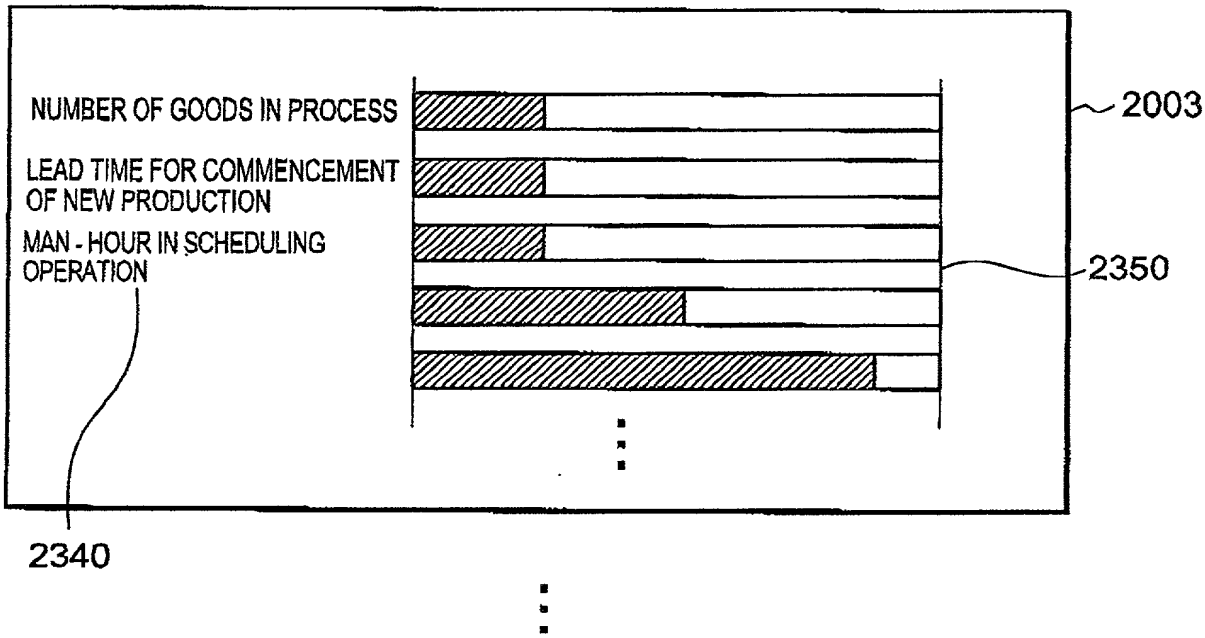

NUMBER OF GOODS IN PROCESS
LEAD TIME FOR COMMENCEMENT OF NEW PRODUCTION
MAN - HOUR IN SCHEDULING OPERATION
2003
2350
2340

FIG.22

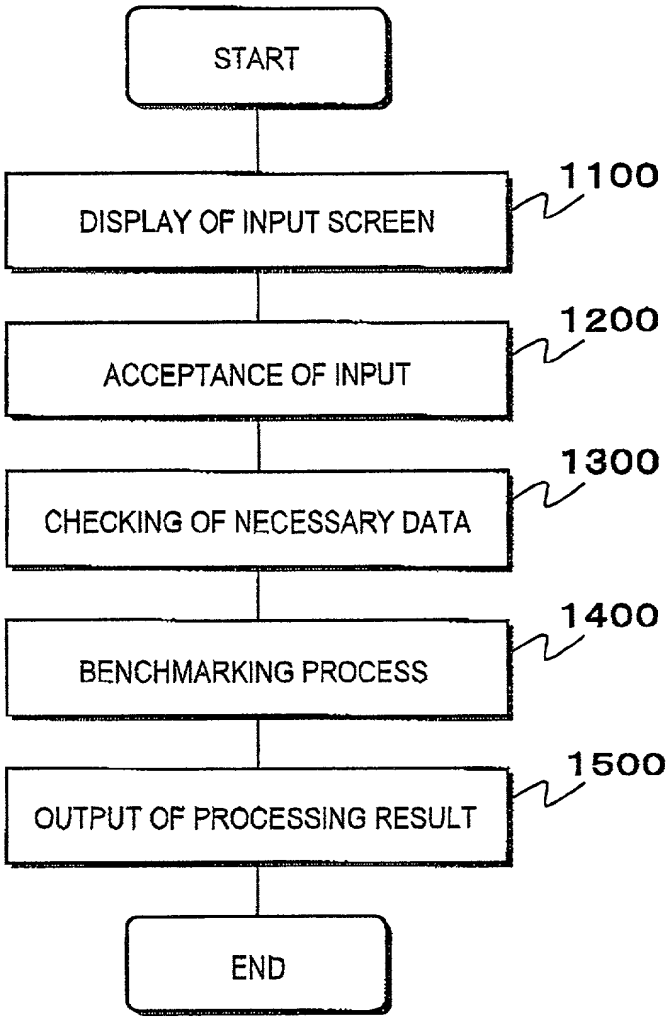

START
DISPLAY OF INPUT SCREEN
1100
ACCEPTANCE OF INPUT
1200
CHECKING OF NECESSARY DATA
1300
BENCHMARKING PROCESS
1400
OUTPUT OF PROCESSING RESULT
1500
END

FIG.23

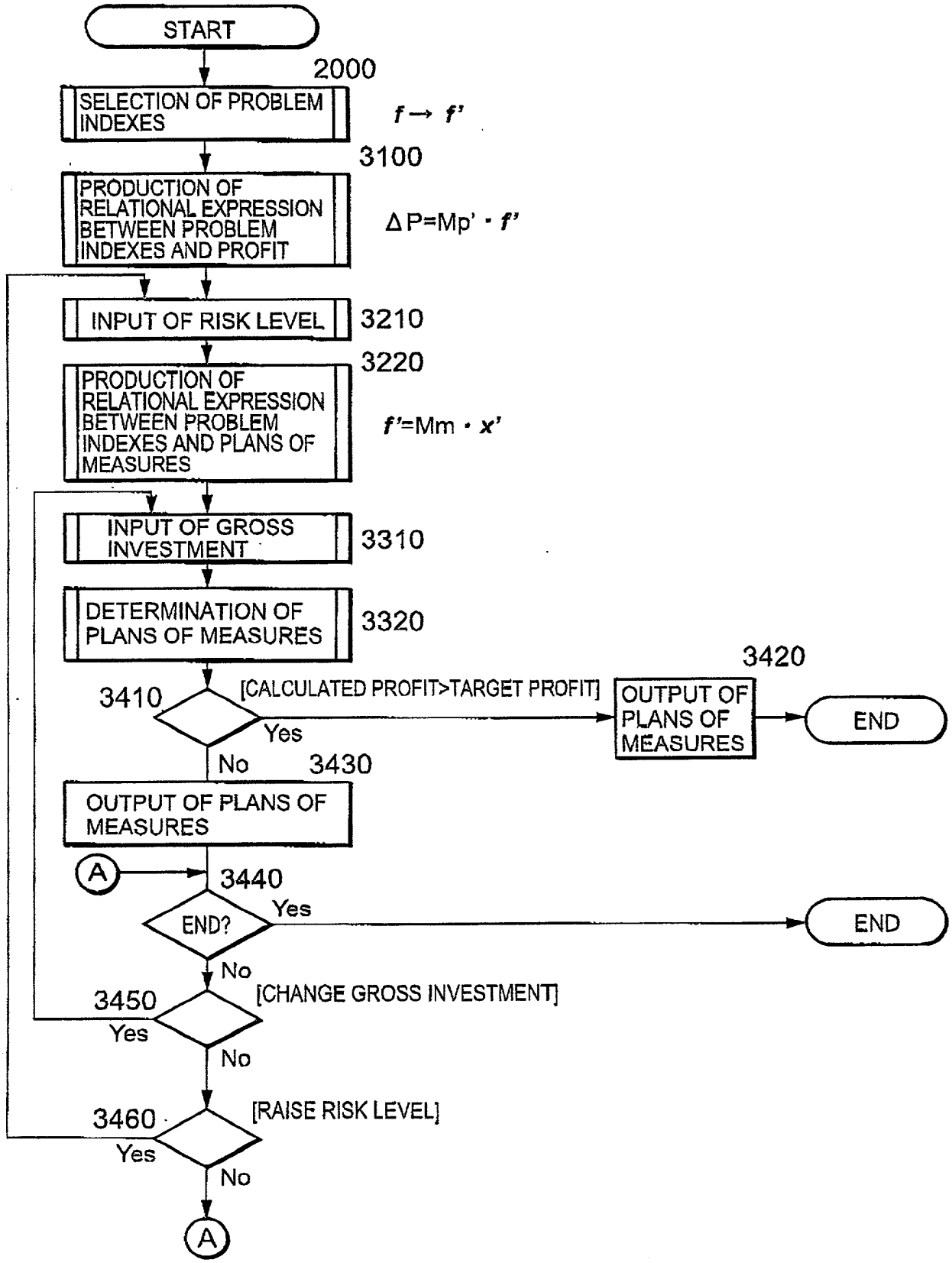

START
2000
SELECTION OF PROBLEM INDEXES
f → f'
3100
PRODUCTION OF RELATIONAL EXPRESSION BETWEEN PROBLEM INDEXES AND PROFIT
ΔP=Mp' · f'
INPUT OF RISK LEVEL
3210
3220
PRODUCTION OF RELATIONAL EXPRESSION BETWEEN PROBLEM INDEXES AND PLANS OF MEASURES
f'=Mm · x'
INPUT OF GROSS INVESTMENT
3310
DETERMINATION OF PLANS OF MEASURES
3320
3420
3410
[CALCULATED PROFIT>TARGET PROFIT]
OUTPUT OF PLANS OF MEASURES
END
Yes
No
3430
OUTPUT OF PLANS OF MEASURES
A
3440
END?
Yes
END
No
3450
[CHANGE GROSS INVESTMENT]
Yes
No
3460
[RAISE RISK LEVEL]
Yes
No
A

FIG.24

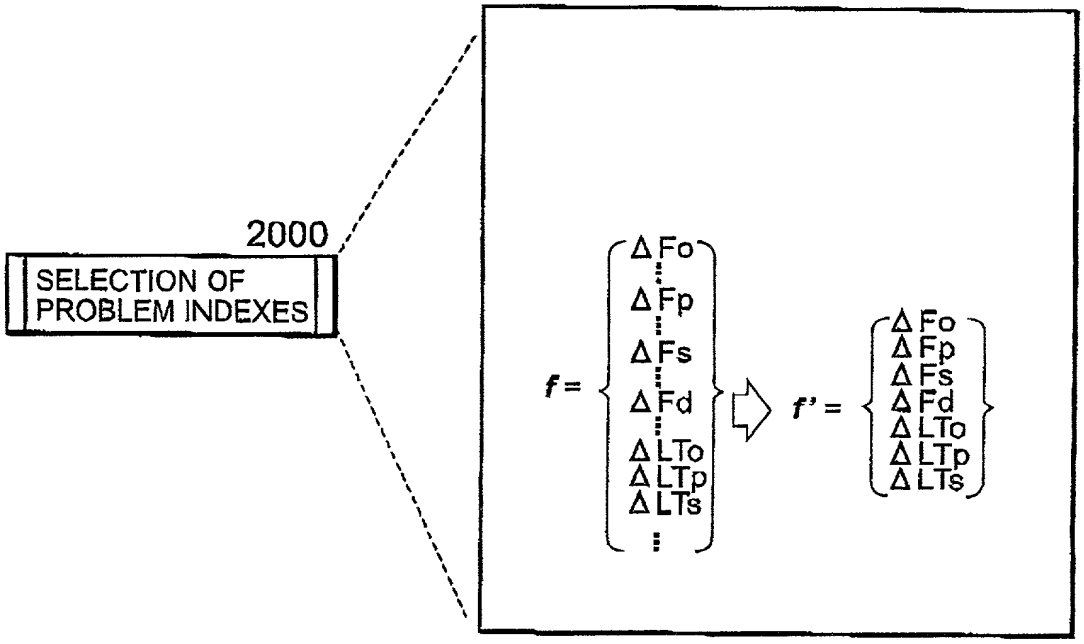

2000
SELECTION OF PROBLEM INDEXES
f =
ΔFo
ΔFp
ΔFs
ΔFd
ΔLTo
ΔLTp
ΔLTs
f' =
ΔFo
ΔFp
ΔFs
ΔFd
ΔLTo
ΔLTp
ΔLTs

FIG.25

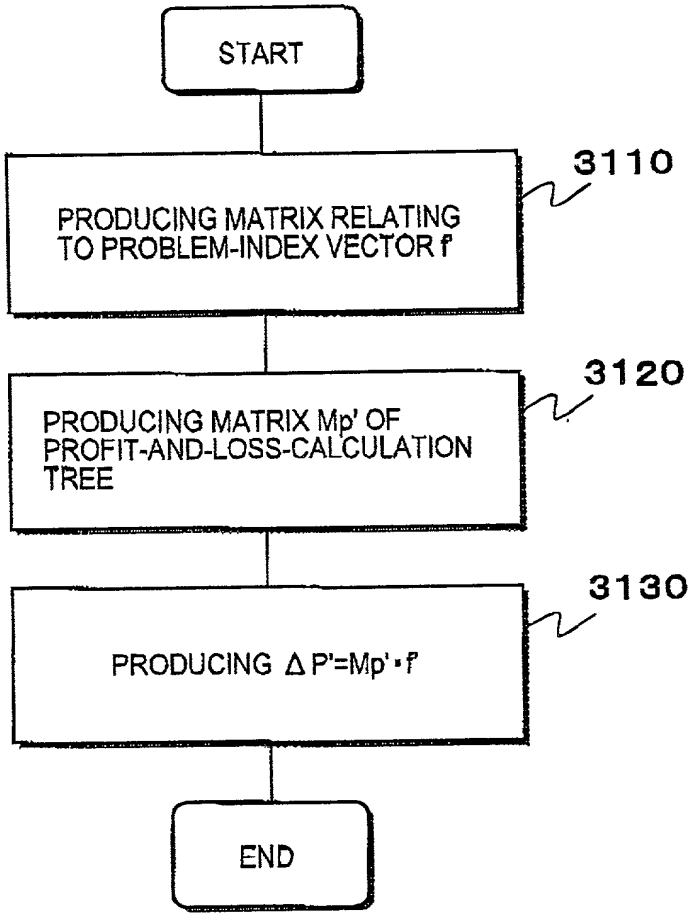

START
PRODUCING MATRIX RELATING TO PROBLEM-INDEX VECTOR f'
3110
PRODUCING MATRIX Mp' OF PROFIT-AND-LOSS-CALCULATION TREE
3120
PRODUCING ΔP'=Mp'·f'
3130
END

FIG.26A

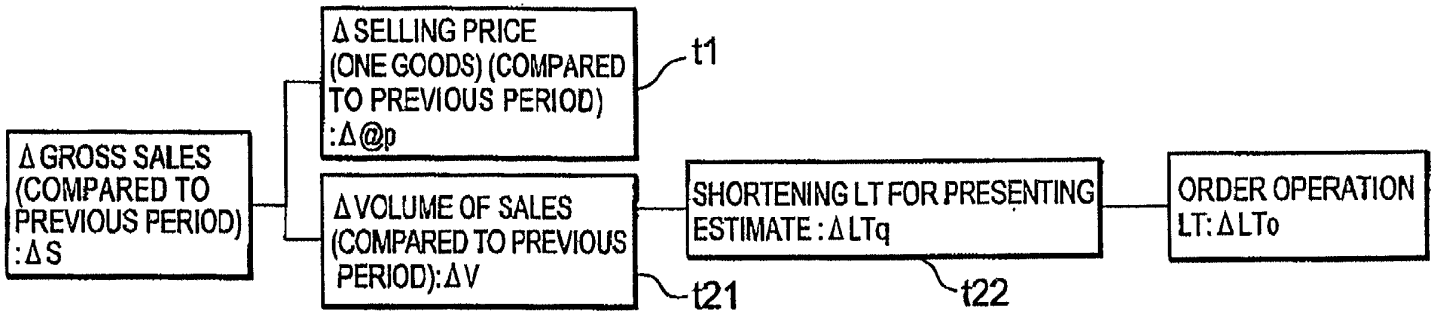


FIG.26B

ΔGROSS SALES: ΔS = ΔSELLING PRICE (ONE GOODS) (COMPARED TO PREVIOUS PERIOD) :Δ@p × ΔVOLUME OF SALES (COMPARED TO PREVIOUS PERIOD): ΔV

ΔVOLUME OF SALES (COMPARED TO PREVIOUS PERIOD): ΔV = β × SHORTENING LT FOR PRESENTING ESTIMATE : ΔLTq

= ΔSELLING PRICE (ONE GOODS) (COMPARED TO PREVIOUS PERIOD) :Δ@p × β × SHORTENING LT FOR PRESENTING ESTIMATE : ΔLTq

$= a_q \times$ SHORTENING LT FOR PRESENTING ESTIMATE : ΔLTq

SHORTENING LT FOR PRESENTING ESTIMATE : ΔLTq $= a_{qo} \times$ ORDER OPERATION LT: ΔLTo

$= a_q \times a_{qo} \times \Delta LTo$

$= a_0 \times \Delta LTo$

$= Ms' \cdot f'$

WHERE $Ms' = \{0\ 0\ 0\ 0\ a_0\ 0\ 0\}$

FIG.27

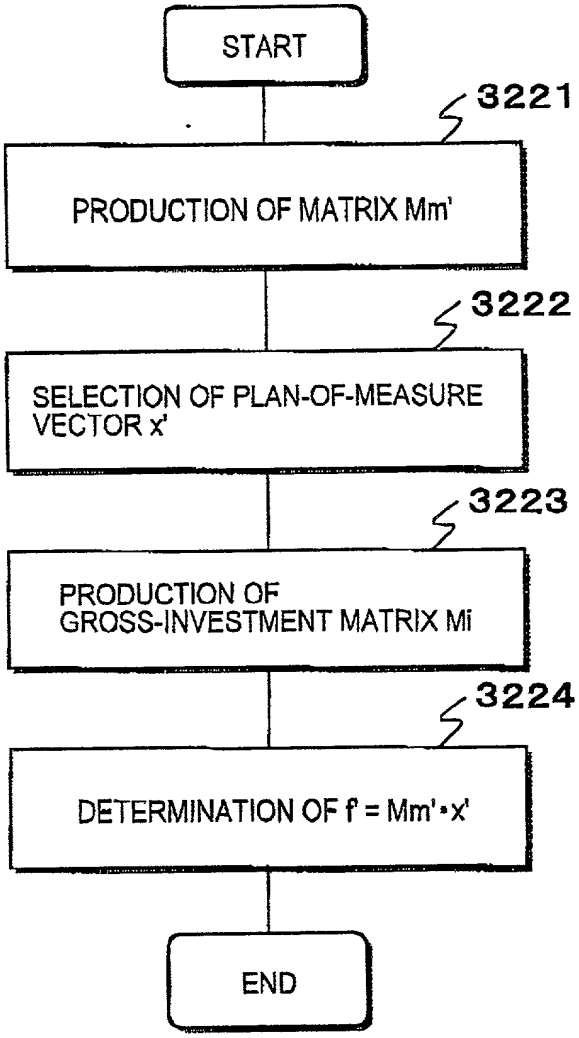

START
3221
PRODUCTION OF MATRIX Mm'
3222
SELECTION OF PLAN-OF-MEASURE VECTOR x'
3223
PRODUCTION OF GROSS-INVESTMENT MATRIX Mi
3224
DETERMINATION OF f' = Mm'•x'
END

FIG.28

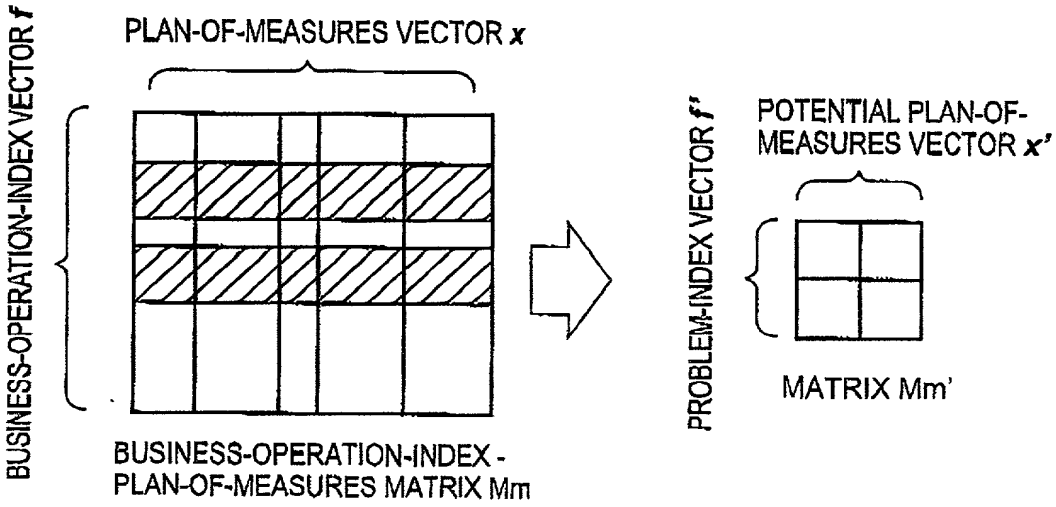
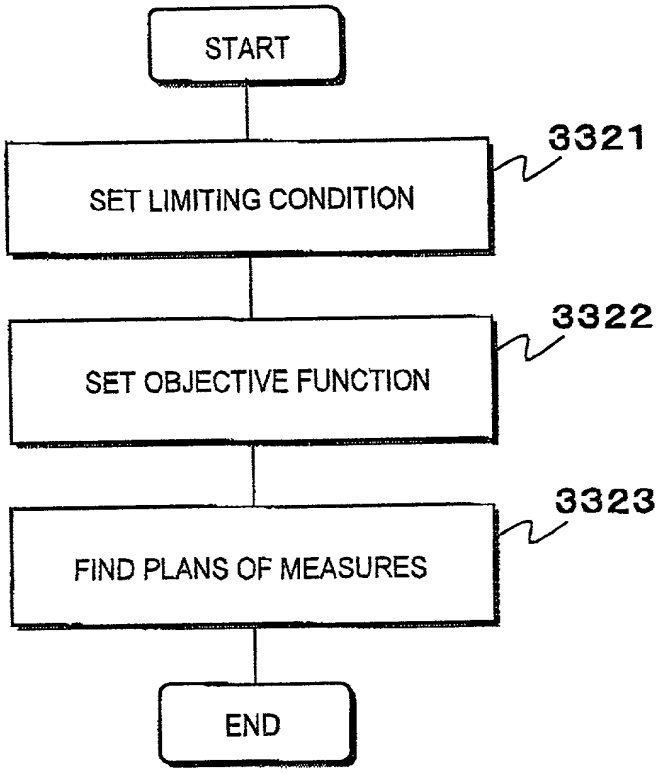

PLAN-OF-MEASURES VECTOR x
BUSINESS-OPERATION-INDEX VECTOR f
BUSINESS-OPERATION-INDEX - PLAN-OF-MEASURES MATRIX Mm
POTENTIAL PLAN-OF-MEASURES VECTOR x'
PROBLEM-INDEX VECTOR f'
MATRIX Mm'

FIG.29

		1	2	3	4	5	6	7	8	9
	PLAN OF MEASURES	INTRODUCTION OF ORDER MANAGEMENT SUBSYSTEM 1	INTRODUCTION OF ORDER MANAGEMENT SUBSYSTEM 2	INTRODUCTION OF ORDER MANAGEMENT SUBSYSTEM 3	INTRODUCTION OF PRODUCTION MANAGEMENT SUBSYSTEM 1	INTRODUCTION OF PRODUCTION MANAGEMENT SUBSYSTEM 2	INTRODUCTION OF PRODUCTION MANAGEMENT SUBSYSTEM 3	INTRODUCTION OF PROCUREMENT MANAGEMENT SUBSYSTEM 1	INTRODUCTION OF PROCUREMENT MANAGEMENT SUBSYSTEM 2	INTRODUCTION OF PLANT 1 FOR PRODUCTION
	INVESTMENT COST (M¥)	5	7	3	10	10	10	3	10	10
	RISK LEVEL	1	1	2	1	1	2	1	1	1
	PROCESSING VARIABLE	× 1 {0,1}	× 2 {0,1}	× 3 {0,1}	× 4 {0,1}	× 5 {0,1}	× 6 {0,1}	× 7 {0,1}	× 8 {0,1}	× 9 {0,1}
1	ΔFo	m11	m12	m13						
2	ΔFp				m24	m25	m26			
3	ΔFs							m37	m38	
4	ΔFd									m49
5	ΔLTo	m51	m52	m53						
6	ΔLTp				m64	m65	m66			
7	ΔLTs							m77	m78	

FIG.30


START
SET LIMITING CONDITION
3321
SET OBJECTIVE FUNCTION
3322
FIND PLANS OF MEASURES
3323
END